

## EVALUATION OF THE MICROBIOLOGICAL QUALITY AND STUDY OF BACTERIAL COMMUNITY ISOLATED FROM RAW MILK

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### Introduction

Raw milk is an ideal substrate for the development of spoilage and pathogenic microorganisms. Its quality and safety depend on environmental factors, such as milking hygiene and sanitary conditions, and individual factors, such as animal health, and this directly influences dairy products. Therefore, the present study aimed to evaluate the microbiological quality of raw milk from bulk tanks milk, to identify the bacteria isolated from freshly milked raw milk and also, to evaluate the antimicrobial resistance profile of *Enterobacteriaceae* and *Staphylococcus* spp.

### Method

During the period between October and December of 2019, samples of raw milk were collected from the bulk tank milk of three farms in the southern and northwestern regions of Rio de Janeiro. The microbiological quality of the bulk tank milk samples was evaluated through somatic cell count (SCC), using the Somaticell® Kit (Idexx), and total bacteria count (TBC), using the pour plate technique plate (ISO, 2013). Also, 105 samples of raw milk freshly milked from the udders of 55 animals were subjected to isolation of *Enterobacteriaceae*, using Compact Dry EC (Nissui Pharmaceutical) and *Staphylococcus* spp, using Compact Dry X-SA (Nissui Pharmaceutical). Around three colonies, in each culture medium, were selected and identified using Matrix-Assisted Laser Ionization Desorption Mass Spectrometry (MALDI TOF MS; Microflex LT - Bruker Daltonik GmbH). The isolates identified as *Enterobacteriaceae* and *Staphylococcus* spp. were evaluated for antimicrobial resistance using the disk diffusion test (CLSI, 2020).

### Results / Discussion

Only one farm presented the bulk tank milk within the standards established by the legislation (mean of  $3 \times 10^5$  CFU of TBC/ml and  $5 \times 10^5$  SCC/ml; Brasil, 2018), TBC mean of  $1 \times 10^3$  CFU/ml and SCC mean of  $5 \times 10^5$  SCC/ml. The bulk tank milk of a farm had TBC mean of  $2.9 \times 10^5$  CFU/ml, however, the SCC mean was  $8.7 \times 10^5$ /ml. The other farm presented an average of  $5 \times 10^5$  SCC/ml and TBC of  $8 \times 10^7$  UFC/ml. Elevated TBC may indicate poor hygiene during milking and/or inadequate cooling and SCC in milk is due to the desquamation of the mammary gland epithelium and the presence of leukocytes, indicating inflammation (RUEGG and REINEMANN, 2018). Freshly milked raw milk samples showed a bacterial diversity of Firmicutes (73; 56.59%), Proteobacteria (55; 42.64%) and Actinobacteria (1; 0.78%). *Staphylococcaceae* (66; 51.16%) and *Enterobacteriaceae* (38; 29.46%) were the most prevalent, with emphasis on *Staphylococcus aureus* (39; 30.23%), *Staphylococcus* spp. (17; 13.18%) and *Klebsiella oxytoca* (16; 12.40%). *Enterobacteriaceae* showed high resistance (74%) to Ampicillin and 26.09% were multidrug resistant (MDR). *Staphylococcus* spp. were highly (78%) resistant to Penicillin G, 13.04% had MDR phenotype and 4% were MRSA. It is necessary to implement Good Agricultural Practices to guarantee the quality and safety of raw milk and, consequently, its derivatives.

## Conclusion

Raw milk from the bulk tank milk of most farms is of unsatisfactory quality. Raw milk can offer a potential risk to consumer's health, concerning staphylococcal intoxication, since refrigeration failures can favor the production of enterotoxigenic toxins which, because they are thermostable, are not inactivated during processing. Raw milk is an important vehicle for *Enterobacteriaceae* and *Staphylococcaceae* resistant to antimicrobials, especially multidrug-resistant and methicillin-resistant *Staphylococcus aureus*.

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